

**(19) World Intellectual Property Organization  
International Bureau**



(43) International Publication Date  
4 November 2004 (04.11.2004)

PCT

(10) International Publication Number  
**WO 2004/094710 A1**

(51) International Patent Classification<sup>7</sup>:  
1/16, 1/18, A45F 3/22, 3/24

D04B

81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

**(21) International Application Number:** PCT/AU2004/000536

**(22) International Filing Date:** 23 April 2004 (23.04.2004)

**(25) Filing Language:** English

(26) Publication Language: English

34) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

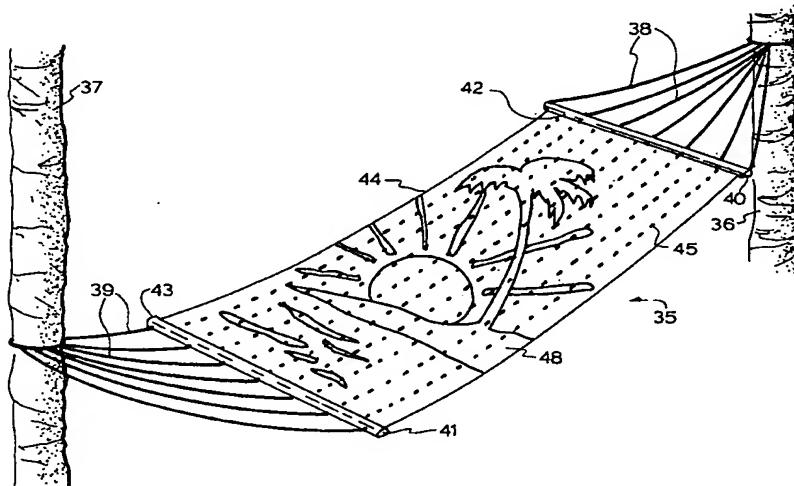
(30) Priority Data:  
2003901945 24 April 2003 (24.04.2003) AU  
2003903639 16 July 2003 (16.07.2003) AU

(71) **Applicant and**  
(72) **Inventor: LYONS, Beaumont, Gregory [AU/AU]; 3/97**  
Jigsaw Street, Sumner Park, Queensland 4074 (AU).

**Published:**  
— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(54) Title: IMPROVED HAMMOCK AND SPREADING ROD**



**(57) Abstract:** A fabric is provided for use in outdoor furniture and formed from synthetic material with a stretch characteristic of 5% to 50%. The fabric 10 may have differential stretch characteristics in a first direction (16, 18) and greater stretch characteristics in a second direction (25, 26) substantially perpendicular to the first direction. The fabric is preferably warp knitted and used in the manufacture of a hammock or hammock chair. A hammock may have a lesser stretch characteristic along its length and a greater stretch characteristic transverse and preferably includes a plurality of ventilation apertures (45). Printed indicia (48) may be printed on the surface of the fabric when used in a hammock or hammock chair and may indicate ownership, club loyalties, personalised visual signs or other special interests. The invention extends to a flexible spreading rod (55, 56) for use in a hammock (50). The spreading rod is preferably located in a sleeve (76) at either end of the hammock or may be supported directly by a hammock stand (51).

WO 2004/094710 A1

**"IMPROVED HAMMOCK AND SPREADING ROD"****FIELD OF THE INVENTION**

THIS INVENTION relates to a material for use in furniture, particularly 5 outdoor furniture. More specifically, the invention extends to material for use in hammocks and hammock chairs and includes those items when made from the material. The invention also extends to a method of decorating a hammock or hammock chair by a printing process, particularly when used for promotional indicia. The invention also extends to a flexible or semi-rigid spreading rod for use in a hammock and a hammock 10 incorporating the spreading rod.

**BACKGROUND OF THE INVENTION**

Hammocks have been in use for hundreds of years. It is generally accepted that the hammock originated in Central America approximately 1,000 years ago and was created by the Mayan Indians. The earliest hammocks were produced by weaving the bark 15 of trees.

As a result of pre-existing trade roots, the hammock found its way throughout Central and South America. The original web-like hammock also eventually gave rise to a cloth or fabric hammock.

Hammocks were introduced to Europe by Columbus. They then became 20 adopted by seafarers, particularly of Britain, and France. The Europeans generally relied on canvas cloth for their hammocks and this means of bedding was used by the British Navy for three centuries.

Hammocks were introduced into the British prison system during the 1800s and were usually supported by looped ring ends which were hung over two spaced hooks 25 for use. They were then removed or either simply hung off one hook for storage when not in use.

The hammock has become an established means of comfortable support either for resting or for use as a bed. It is estimated that over 100,000,000 people use hammocks as beds or furniture everyday and these people are distributed throughout 30 Africa, China, Philippines, South Pacific, Central and South America, North America and Europe.

Most hammocks are today made from hemp or cotton. The use of cotton in hammocks is a relatively new event in the history of the item and began only in the last 50 to 60 years. A problem that arises, particularly with cotton, is that when used outdoors, the material tends to absorb moisture, either from sweat or the atmosphere, and begin to rot 5 relatively quickly.

Synthetic materials, such as nylon and polyester, have been tried, particularly in outdoor hammocks, as they do not absorb moisture and are highly resistant to rot. The major problem with these items is that they tend to lack a significant comfort level because they do not absorb sweat, they feel clammy and as they have no or little 10 natural "give", they tend to be regarded as too hard by users.

Hammocks are generally woven from cotton, nylon and polyester. The woven cotton hammocks have a small degree of stretch capabilities because of the inbuilt stretch characteristics of cotton yarn. Nylon and polyester yarn do not stretch and therefore woven hammocks made from these materials are very rigid and uncomfortable. 15 Cotton absorbs moisture, nylon and polyester do not, and are therefore "sweaty" in use.

The ability to stretch according to body pressure is an important factor in hammocks. Individual cotton fibres stretch, not only in the material of the hammock bed, but also in the supporting cords. The combined stretch factor of the bed and the cords give the cotton hammock its comfort level, which is regarded by many as superior. Synthetic 20 materials, as conventionally used, do not stretch and hammocks made from these types of substances are traditionally regarded as not very comfortable.

Reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that this prior art forms part of the common general knowledge in any country.

25 SUMMARY OF THE INVENTION

Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element or integer or group of elements or integers but not the exclusion of any other element or integer or group of elements or integers.

30 In a first aspect, the invention resides in a fabric for use in furniture, particularly outdoor furniture, the fabric formed, at least in part, from a synthetic material

wherein the synthetic material is woven or knitted to provide a stretch characteristic of from 5% to 50%.

Preferably, the synthetic material is warp knitted. The fabric may have an interlocking weave pattern adapted to provide the preferred stretch characteristics.

5 The synthetic material may comprise one or more of nylon, polyester, polypropylene, polyethylene or a suitable polyolefin material. The synthetic material may comprise a blend which includes a component of a natural material such as cotton. The cotton may be present at up to 50% of the blend.

10 Most preferably, the fabric has a first stretch characteristic in a first direction and a second greater stretch characteristic in a second direction which is substantially perpendicular to the first direction.

The stretch characteristic in the first direction may be any suitable percentage but is preferably 10% or less.

15 The stretch characteristic in the second direction may be any suitable percentage greater than that of the first direction but is preferably from 10% to 50%. Most preferably, it is from 20% to 40%.

20 In a preferred embodiment, the fabric has a plurality of ventilation holes. The ventilation holes may be distributed in any pattern but are preferably distributed in a regular pattern. The ventilation holes may be present in sufficient number to provide a ratio of material/holes of 80%/20% or 70%/30%.

The ventilation holes may vary from 2mm to 50mm in diameter when formed as circles. Preferably, they are formed around 5mm in diameter. They may be formed in any suitable shape. One preferred shape is slit-like or ellipsoidal.

25 In a further aspect, the invention resides in a hammock or hammock chair comprising fabric of the present invention. Preferably, the fabric is arranged to have its first direction with lesser stretch characteristics aligned, in use, along the head to tail axis of a user and its second direction with greater stretch characteristics aligned transverse to the head to tail axis of a user. The invention may reside in a hammock formed of material of the present invention, the fabric having its first direction of a lesser stretch characteristic aligned along the length of the hammock and its second direction of a greater stretch characteristic aligned across the width of the hammock.

The fabric may be printed with visible indicia. The indicia may include text and/or graphic elements. The indicia may be adapted to identify ownership of the hammock or hammock chair, or advertise products and/or services. The indicia may be personalised for an owner. The indicia may be used in promotional activities, club 5 membership identification and loyalty promotions.

In a further aspect, the invention may reside in a spreading rod for a hammock or hammock chair wherein the spreading rod is formed as a flexible or semi-rigid elongate member. The elongate member is preferably adapted to deform under ordinary loads experienced in a hammock or hammock chair and to an extent compatible 10 with comfortable use of the hammock or hammock chair while assuming its undeformed configuration when not under load.

The spreading rod may have a plurality of apertures dimensioned to receive supporting cords. Alternatively, the spreading rod may be formed integrally with or supported directly by a frame support of a hammock or hammock chair. The flexible 15 elongate member may be formed from one or more of plastic, rubber, spring steel or other suitable material.

The flexible member may be formed from wood with cuts in one side positioned to allow flexion under load with the elongate member retaining adequate strength to support a person or persons in a hammock or hammock chair. The elongate 20 member may be formed from a polyvinyl chloride (PVC) plastic tube, preferably with a diameter of from 10mm to 30mm.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a piece of fabric of the present invention;

FIG. 2 shows the fabric of FIG. 1 with its longitudinal stretch characteristic 25 highlighted;

FIG. 3 shows the fabric of FIG. 1 with its transverse stretch characteristic highlighted;

FIG. 4 shows a top and side view version of one embodiment of a warp knitted fabric;

30 FIG. 5 is a perspective view of a hammock formed according to the present invention and including printed indicia;

FIG. 6 is a perspective view of a hammock and support stand including a spreading rod of the present invention;

FIG. 7 shows the arrangement of FIG. 6 when under load;

5 FIG. 8 shows a part-sectional perspective view of a spreading rod, support cords and hammock end.

#### DETAILED DESCRIPTION OF THE DRAWINGS/PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a section of fabric 10 which is produced from a synthetic material or synthetic/natural fibre combination. The synthetic material is preferably fibres of polyester, polypropylene or polyethylene. Other synthetic materials 10 may be suitable for the present application and a suitable polyolefin polymer material may be utilised. A blend of cotton and a synthetic material as is known to people of skill in the art may also be utilised. The material is preferably knitted or woven with an interlocking weave pattern which allows for a stretch characteristic to be built into the fabric. In the present invention, a stretch characteristic represents the ability of the material to stretch 15 under load and a percentage indication represents the percentage of increase provided at maximum stretch. The fabric comprises material 12 with apertures 13 formed and spread throughout. The apertures may be formed in any suitable shape, preferably compatible with usual manufacturing processes. In the present example, the apertures or ventilation holes are shown as spaced ellipsoidal holes. The shape of the apertures themselves may 20 provide some degree of differential stretch. The degree of extension of the holes in the direction of arrow 14 is less than that available in the direction of the arrow 15. Along lines of force including the apertures 13, the degree of stretchability or stretch characteristics will therefore vary. The apertures in their own right may be used to provide differential or varying stretch characteristics in different directions.

25 In FIG. 2, the material 10 is shown with the stretch characteristics highlighted by arrows 16, 18 in a first direction up or along the long axis of the fabric 10. The ability to insert stretch characteristics is known in the knitting and weaving industry. Warp knitting is a relatively recent technique which allows the variability to be spread uniformly or, as shown in FIG. 2, provided in bands 19, 20, 21 while other bands 22, 23 30 remain somewhat bunched but also extend as required to provide suitable stretchability.

FIG. 3 shows the fabric 10 when stretched in a second direction which is

substantially transverse to the direction of FIG. 2. The stretch characteristic in this direction are more pronounced giving a differential characteristic between the first direction 16, 18 of FIG. 2 and second direction 25, 26 of FIG. 3.

5 The difference between the stretch characteristics may be altered as suitable for individual purpose. The weave pattern and stretch characteristics may vary dependent on the hammock application. Generally speaking, it is preferred to have a hammock, for example, with a minimum stretch at no more than 10% length ways but with 10% to 50% stretch in the second direction or width. The interlocking weave pattern can be varied, as known in the weaving and knitting art, to suit different hammock applications.

10 The fabric comprises an interlocking knitted construction pattern used to modify the stretch characteristics. The ventilation holes may be knitted into the fabric at regular intervals to facilitate breathing of the fabric and also allow cooling circulation of air to flow through the material in use.

15 Warp knitting has developed a reinforcement technique in which the key reinforcements are locked in with a skeleton of knit fibres which can be oriented in longitudinal and/or transverse directions. Warp knitting represents the fastest method of producing fabric from yarns. It differs from weft knitting in that each needle loops its own thread. The needles produce parallel rows of loops simultaneously that are interlocked in a zig zag pattern. The fabric is produced in sheet or flat form using one or more sets of warp 20 yarn. The yarns are fed from warp beams to a row of needles extending across the width of the knitting machine. Two common types of warp knitting machines are the Tricot and Raschel machines. Raschel machines are useful because they can process all yarn types in all forms (filament, staple, combed, carded and others). Warp knitting may sometimes be referred to as warp weaving.

25 While warp knitting is a preferred method for producing the material, any other method known to a person skilled in material manufacture may also be recruited for the purpose.

30 Weft knitting, on the other hand, uses one continuous yarn to form courses or rows of loops across a fabric. There are three fundamental stitches in weft knitting: plain-knit, purl and rib. On a knitting machine, the individual yarn is fed one or more needles at a time.

In FIG. 4, an example of warp knitting is shown. This is by way of example only and should not be regarded as providing a limiting example or even an appropriate or applicable example for the fabric of the present invention. The shown pattern represents a multi-axial, multi-ply fabric demonstrating two diagonal yarn sets 28, 29 overlaid on two 5 biaxial yarn sets 30, 31 locked together by looping yarn 32.

Furniture incorporating the fabric of the present invention can be provided with desired or preferred stretch characteristics as required. FIG. 5 shows a preferred embodiment of use of the fabric of the present invention in the form of a hammock 35 supported between two trees 36, 37. Support cords 38, 39 are tethered to the trees 36, 37 10 and run out to a spreading bar or rod 40, 41 respectively, which are located in corresponding sleeves 42, 43. The sleeves are continuous with the body of the hammock 44 which is formed with a plurality of ventilation holes 45 evenly spread over the surface of the body 44. The hammock has stretch characteristics along its length of up to 10% but transverse stretch characteristics of between 10% and 50%. The material could have a 15 minimum proportion of around 70% solid material and 30% ventilation holes. Preferably, the ratio of solid material to holes is around 80% to 20%. The holes may be uniform in size or may be varied in size and shape throughout the body 44.

The hole size and shape may be a factor in the stretch characteristics of the material. The hole size and shape may be aligned so the bed material has limited stretch in 20 the first direction and pronounced stretch in a transverse direction. The holes in the fabric open and close dependent on body pressure applied at the spot or region of a particular hole. By making the hole oval, rectangular or an elongated diamond shape, the stretch factor may be controlled in either direction. Preferably, the longer axis of the hole is parallel to the length of the hammock and the shorter axis parallel with the width of the 25 hammock to give the hammock a stretch factor of different characteristics in the different direction.

The hammock 35 has a visible graphic device 48 which, in this case, is a low sun and island scene. Synthetic materials are better able to receive printed application. Cotton fails to hold printing which tends to run and fade dramatically, particularly in 30 sunlight. On a synthetic surface, simple and well known printing techniques may be used to provide a whole range of visible scenes. In one form, the scenes may be provided as

uniform and colourful indicators of ownership such as the name of a hotel chain, the trade mark of a manufacturer or colour coordinated renditions to provide an attractive scene on, for example, a beach. A particular club or other group of like-minded people may obtain hammocks which indicate their club loyalty such as, for example, to a sporting club, a 5 travel or adventure club. Appropriately decorated hammocks may be used as promotional material for upcoming events or provided to, for example, attendees at a conference or similar. Printed representations of favoured celebrities such as actors or pop personalities may be rendered onto the surface of the hammock therefore providing additional appeal and idiosyncratic effect to a person's hammock. In one embodiment, hammocks may be 10 personalised by printing specifically for an individual consumer with, for example, their name, photograph of their pet, or a preferred scene from a book or Internet source. For each purpose, the indicia may be regarded as relevant indicia.

FIG. 6 shows a representation of a hammock 50 and support frame 51. The hammock has a body 52 and support cords 53, 54.

15 The support cords 53 run onto a spreading rod or bar 55, 56, respectively. Opposite ends of the support cords 53, 54 are supported on uprights 57, 58 of the support frame 51. The uprights run into a common horizontal member 59 which, in turn, is supported by feet 60, 61. In this view, the spreading rods 55, 56 are substantially straight and undeformed.

20 A view of the same arrangement as FIG. 6 is seen in FIG. 7 under load from an occupant 62. The spreading rods 55, 56 are adapted to deform, as shown, under load. By using a non-rigid spreading bar, the hammock bed is allowed to flex at the point of most pressure achieving a more comfortable hammock while still opening up the hammock bed. The spreading of the load also avoids wear points which become noticeable with 25 rigid horizontal spreading rods with holes drilled at spaced intervals to receive cords. The purpose of the spreading rod is to spread the hammock fabric so it does not collapse during use. Rigid rods do not bend because the load bearing is taken by the supporting cords which are threaded through the rigid rod spreader directly to the hammock fabric.

30 The spreading rods of the present invention are located in a sleeve which is load bearing thereby spreading the weight from the fabric pocket to the supporting cords. The flexible or semi-rigid spreading rod may be made from any suitable material such as

plastic, rubber, spring steel or other flexible material. A timber rod may be used with flexibility introduced by a series of cuts made along one edge to facilitate bending away from and opening up of the cuts.

In one embodiment, a polyvinyl chloride plastic tube of 10mm to 30mm 5 diameter may be used. Drill holes may be positioned at spaced intervals along the length of the tube which is preferably of 0.5m to 1.5m length. Supporting cords may be passed through the holes of the tube and tied off in a knot large enough to avoid withdrawal through the hole. If the PVC tube is not suitably flexible, shallow cuts may be located along the length of the tube sufficient to improve the flexibility while maintaining adequate 10 strength to support the hammock and occupant. All supporting cords are preferably cut to a similar length.

A closer view is seen in FIG. 7 where the cords 70, 71, 72 are all passed through respective holes, one of which is shown in outline 73. The cords are fixed in place by knot 74 which is large enough to lodge against the aperture 73 and resist withdrawal. 15 The rod 75 is located in its own sleeve 76 which is formed from one end 77 of the fabric. In operation, load is applied to the fabric which in turn is transmitted through the sleeve to the spreading rod 75. The spreading rod 75 deforms to a suitable extent under load so that the load is distributed through the cords 70, 71, 72 preferably in a substantially even manner so that wear on the sleeve and the cords is minimised by an even spread.

20 Throughout the specification, the aim has been to describe the preferred embodiments of the invention without limiting the invention to any one embodiment or specific collection of features. Those of skill in the art will therefore appreciate that, in light of the instant disclosure, various modifications and changes can be made in the particular embodiments exemplified without departing from the scope of the present 25 invention. All such modifications and changes are intended to be included within the scope of the appendant claims.

The claims defining the invention are as follows:

1. A fabric for use in furniture, including outdoor furniture, the fabric formed, at least in part, from a synthetic material wherein the synthetic material is woven or knitted to provide a stretch characteristic of from 5% to 50%.
- 5 2. The fabric of claim 1, wherein the synthetic material is warp knitted.
3. The fabric of claim 2, wherein the synthetic material is warp knitted in an interlocking weave pattern adapted to provide the stretch characteristics.
4. The fabric of claim 1 or claim 3, wherein the synthetic material comprises one or more of nylon, polyester, polypropylene, polyethylene or a polyolefin material.
- 10 5. The fabric of claim 4, wherein the synthetic material is nylon.
6. The fabric of claim 2, wherein the fabric includes a component of cotton.
7. The fabric of claim 1, wherein the fabric has a first stretch characteristic in a first direction and a second greater stretch characteristic in a second direction which is substantially perpendicular to the first direction.
- 15 8. The fabric of claim 7, wherein the stretch characteristic in the first direction is 10% or less.
9. The fabric of claim 7 or claim 8, wherein the stretch characteristic in the second direction is from 10% to 50%.
10. The fabric of claim 1 or claim 7, further comprising a plurality of  
20 ventilation holes.
11. The fabric of claim 10, wherein the ventilation holes are distributed in a regular pattern.
12. The fabric of claim 10, wherein the ventilation holes are present in a sufficient number to provide a ratio of material holes from 70%/30% to 80%/20%.
- 25 13. The fabric of claim 10, wherein the ventilation holes vary in diameter from 2mm to 50mm.
14. The fabric of claim 13, wherein the ventilation holes are around 5mm in diameter.
15. The fabric of claim 10, wherein the ventilation holes are slit-like,  
30 rectangular or ellipsoidal.
16. A hammock or hammock chair including fabric of any one of claim 1 to

claim 15.

17. The hammock or hammock chair of claim 16, wherein the fabric is arranged to have its first direction with a lesser stretch characteristic aligned, in use, approximately along the head to tail axis of a user and its second direction with a greater stretch 5 characteristic aligned transverse to the head to tail axis of a user.

18. The hammock of claim 16, wherein the fabric has its first direction of a lesser stretch characteristic aligned along the length of the hammock and its second direction of a greater stretch characteristic aligned across the width of the hammock.

19. The hammock or hammock chair of claim 16, further comprising printed 10 visible indicia, the indicia including text and/or graphic elements.

20. The hammock or hammock chair of claim 19, wherein the indicia are adapted to identify ownership of the hammock or hammock chair or to advertise products and/or services.

21. The hammock or hammock chair of claim 19, wherein the indicia are 15 personalised for an owner.

22. The hammock or hammock chair of claim 16, further comprising a spreading rod formed as a flexible elongate member adapted to deform under load in a hammock or hammock chair while substantially assuming its undeformed configuration when not under load.

20 23. The hammock or hammock chair of claim 22, wherein the spreading rod has a plurality of apertures dimensioned to receive supporting cords.

24. The hammock or hammock chair of claim 23, wherein the spreading rod is located in a sleeve in the hammock or hammock chair.

25 25. The hammock or hammock chair of claim 22, wherein the spreading rod is formed integrally with or supported directly by a frame support of the hammock or hammock chair.

26. The hammock or hammock chair of claim 22, wherein the flexible elongate member is formed from one or more of plastic, rubber, spring steel, wood or polyvinyl chloride tubing.

30 27. The hammock or hammock chair of claim 22, wherein the spreading rod is formed from polyvinyl chloride plastic tube with a diameter of from 10mm to 30mm.

28. A spreading rod for a hammock or hammock chair formed as a flexible elongate member adapted to deform under load and to assume its undeformed configuration when not under load.

29. The spreading rod of claim 28 comprising a plurality of spaced apertures dimensioned to received supporting cords.

30. The spreading rod of claim 28 formed from one or more of plastic, rubber, spring steel, wood and polyvinyl chloride plastic tubing.

31. The spreading rod of claim 30, wherein the spreading rod is formed from polyvinyl chloride plastic tubing with a diameter of from 10mm to 30mm.

10 32. A method of forming a hammock, the method comprising the steps of:  
warp knitting a fabric from a synthetic material and having a lesser stretch characteristic in a first direction and a greater stretch characteristic in a second direction substantially perpendicular to the first direction;  
aligning the first direction along a length of the hammock and the second direction across the width of the hammock;  
forming a supporting body of the hammock with the fabric.

15 33. The method of claim 32, further comprising the step of forming the fabric with a first stretch characteristic of 10% or less and a second stretch characteristic between 10% and 50%.

20 34. The method of claim 32, further comprising the step of forming a plurality of ventilation apertures in the fabric.

35. The method of claim 32, further comprising the step of fixing a flexible spreading rod at each end of the hammock.

25 36. The method of claim 35, further comprising the step of fixing a plurality of supporting cords to each of the flexible spreading rods.

37. The method of claim 32, further comprising the step of printing visible indicia on the surface of the fabric.

38. A method of promoting a product or event, said method comprising the step of printing relevant material on a hammock or hammock chair of claim 16.

30 39. A method of displaying an interest or affiliation, the method comprising the step of printing relevant indicia on a hammock or hammock chair of claim 16.

- 13 -

40. A method of identifying ownership of a hammock, the method comprising the step of printing identifying indicia on a hammock or hammock chair of claim 16.

ABSTRACT

A fabric is provided for use in outdoor furniture and formed from synthetic material with a stretch characteristic of 5% to 50%. The fabric 10 may have differential stretch characteristics in a first direction (16, 18) and greater stretch characteristics in a second direction (25, 26) substantially perpendicular to the first direction. The fabric is preferably warp knitted and used in the manufacture of a hammock or hammock chair. A hammock may have a lesser stretch characteristic along its length and a greater stretch characteristic transverse and preferably includes a plurality of ventilation apertures (45). Printed indicia (48) may be printed on the surface of the fabric when used in a hammock or hammock chair and may indicate ownership, club loyalties, personalised visual signs or other special interests. The invention extends to a flexible spreading rod (55, 56) for use in a hammock (50). The spreading rod is preferably located in a sleeve (76) at either end of the hammock or may be supported directly by a hammock stand (51).

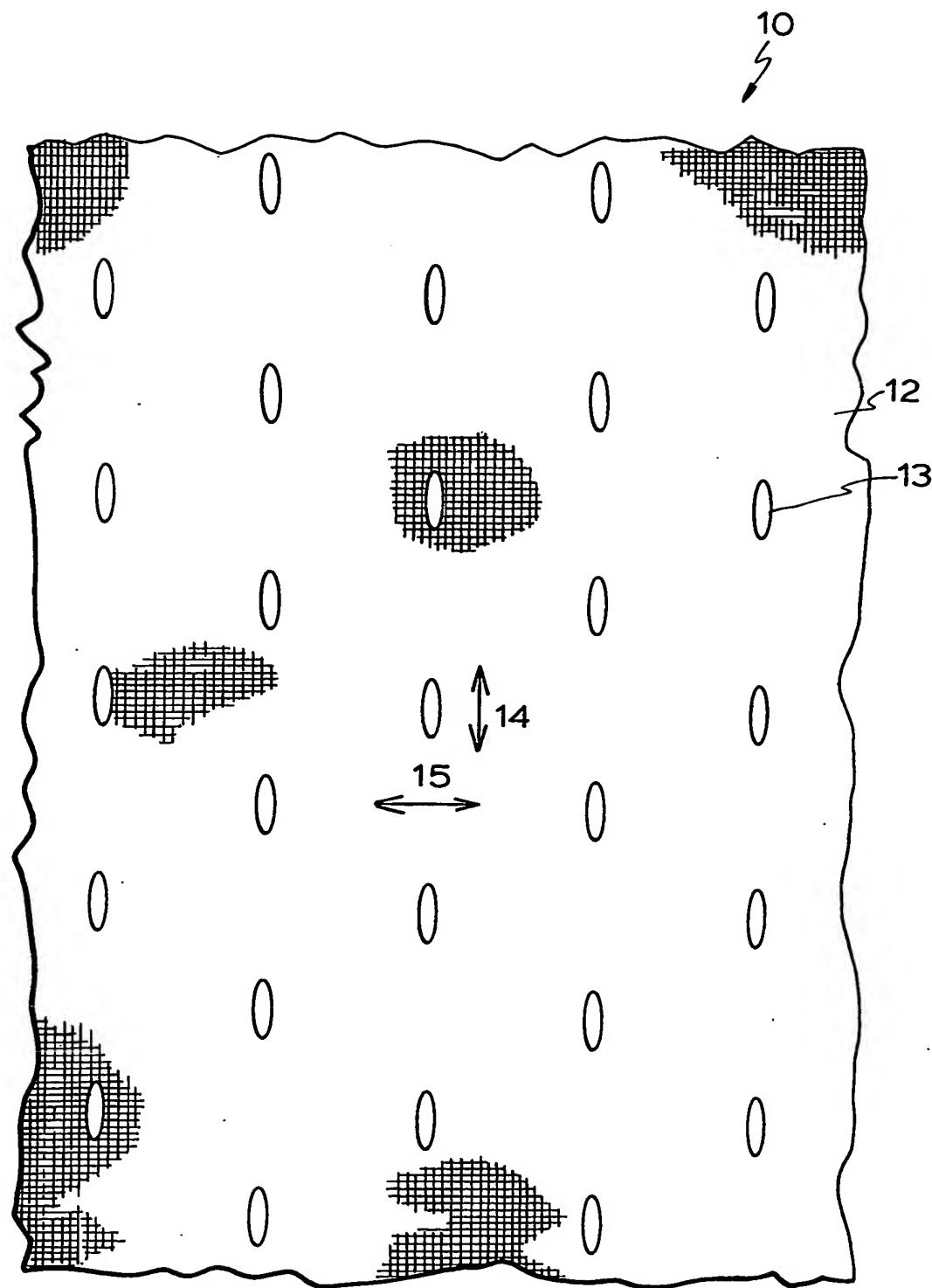


FIGURE 1.

10/554395

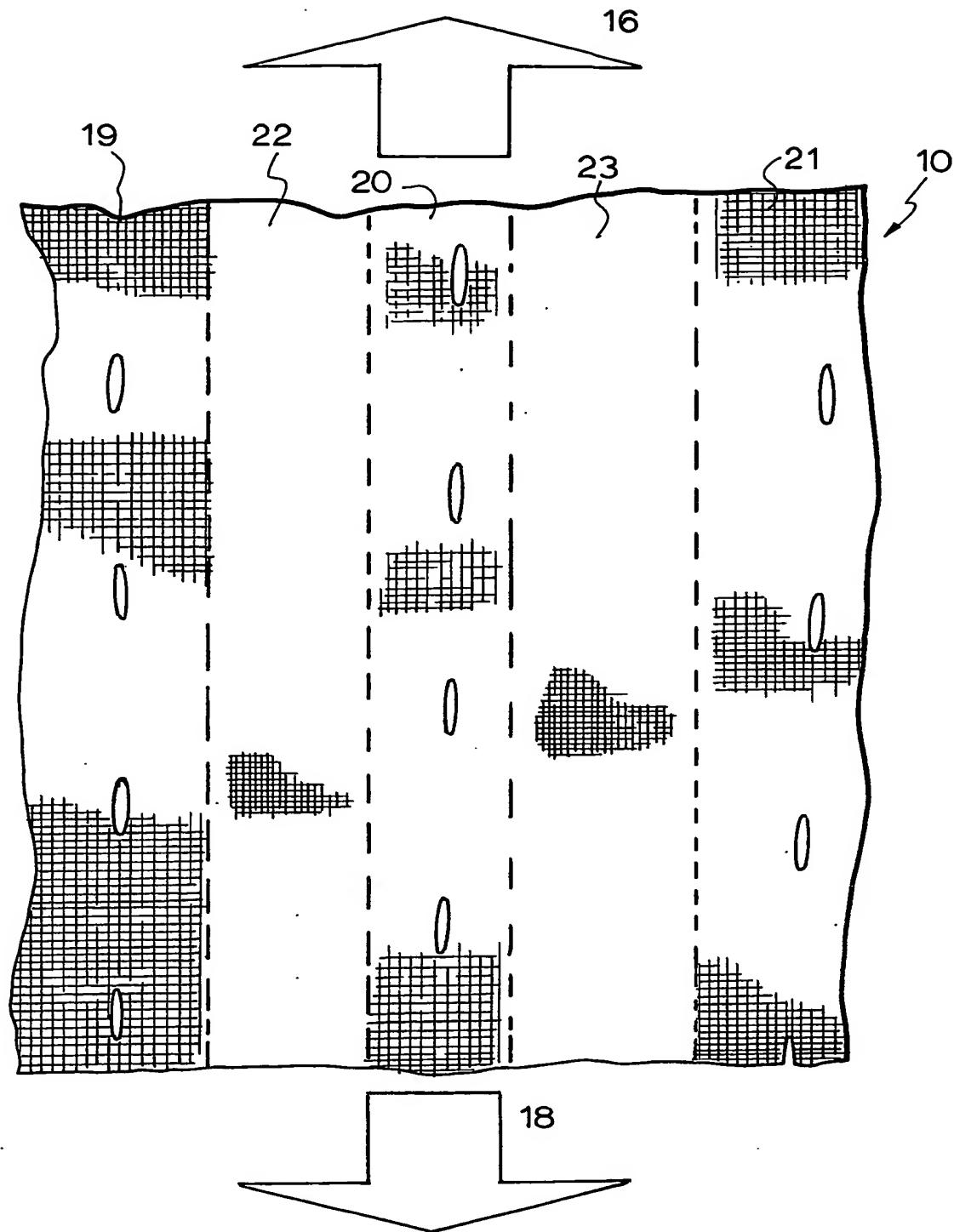


FIGURE 2.

10/554395

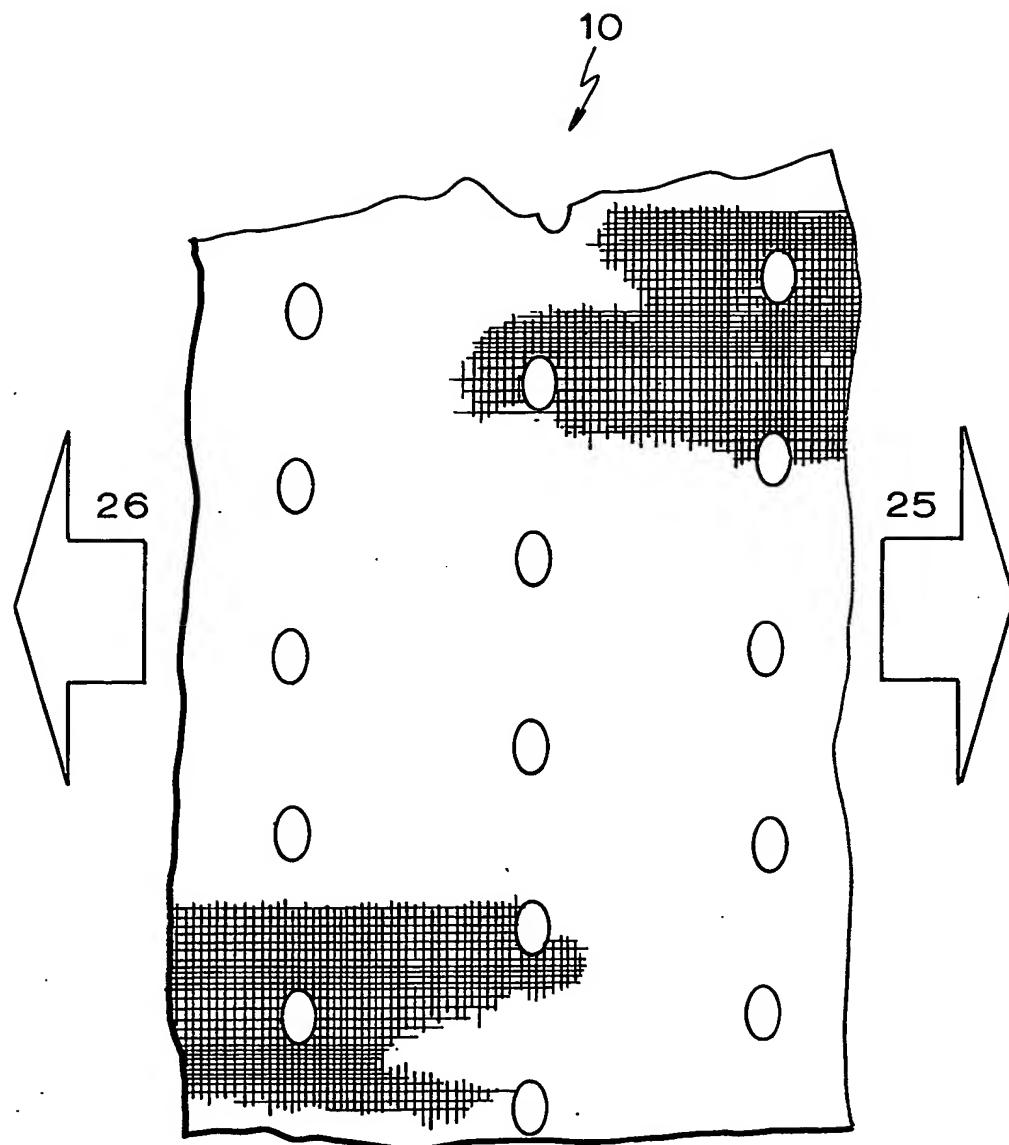


FIGURE 3.

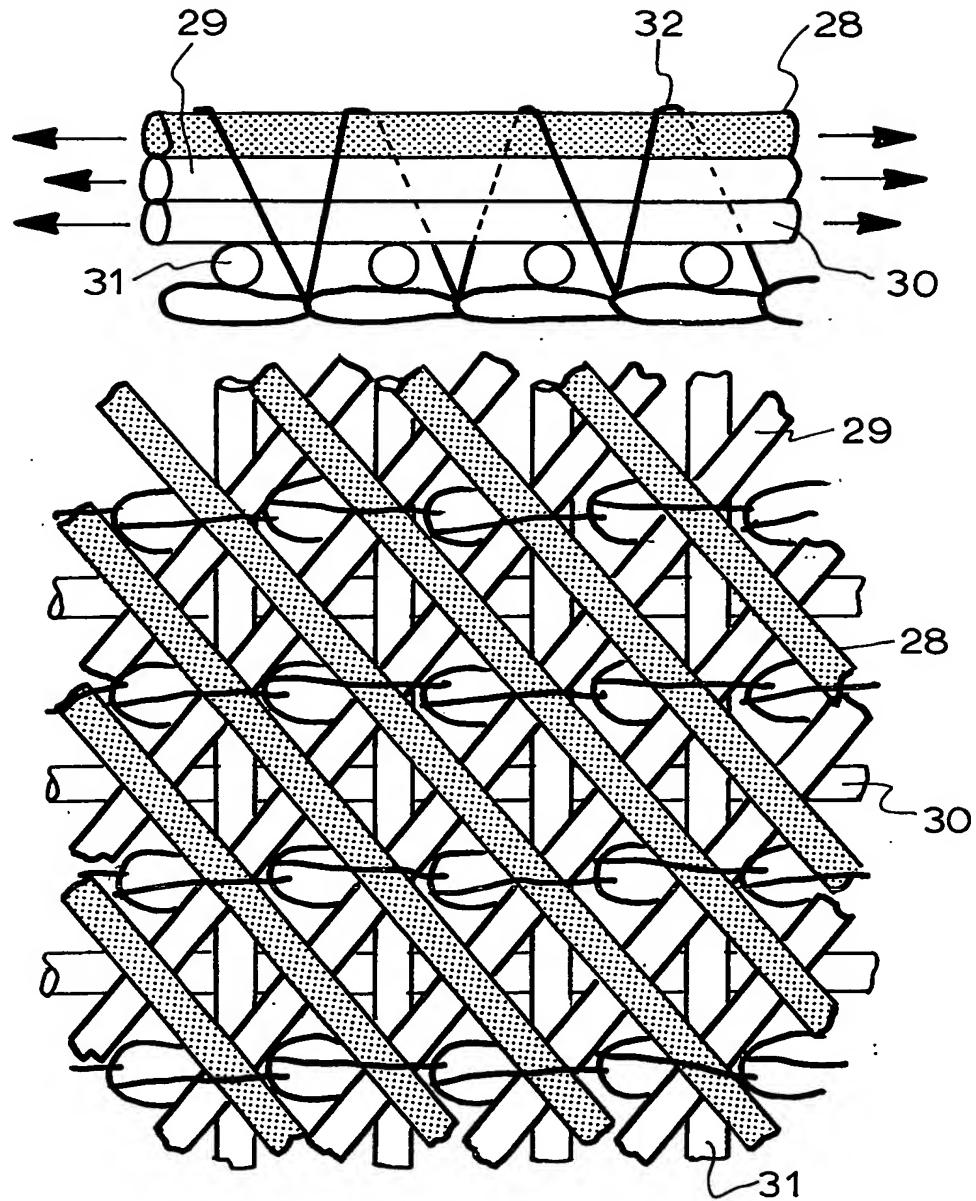


FIGURE 4.

10/554395

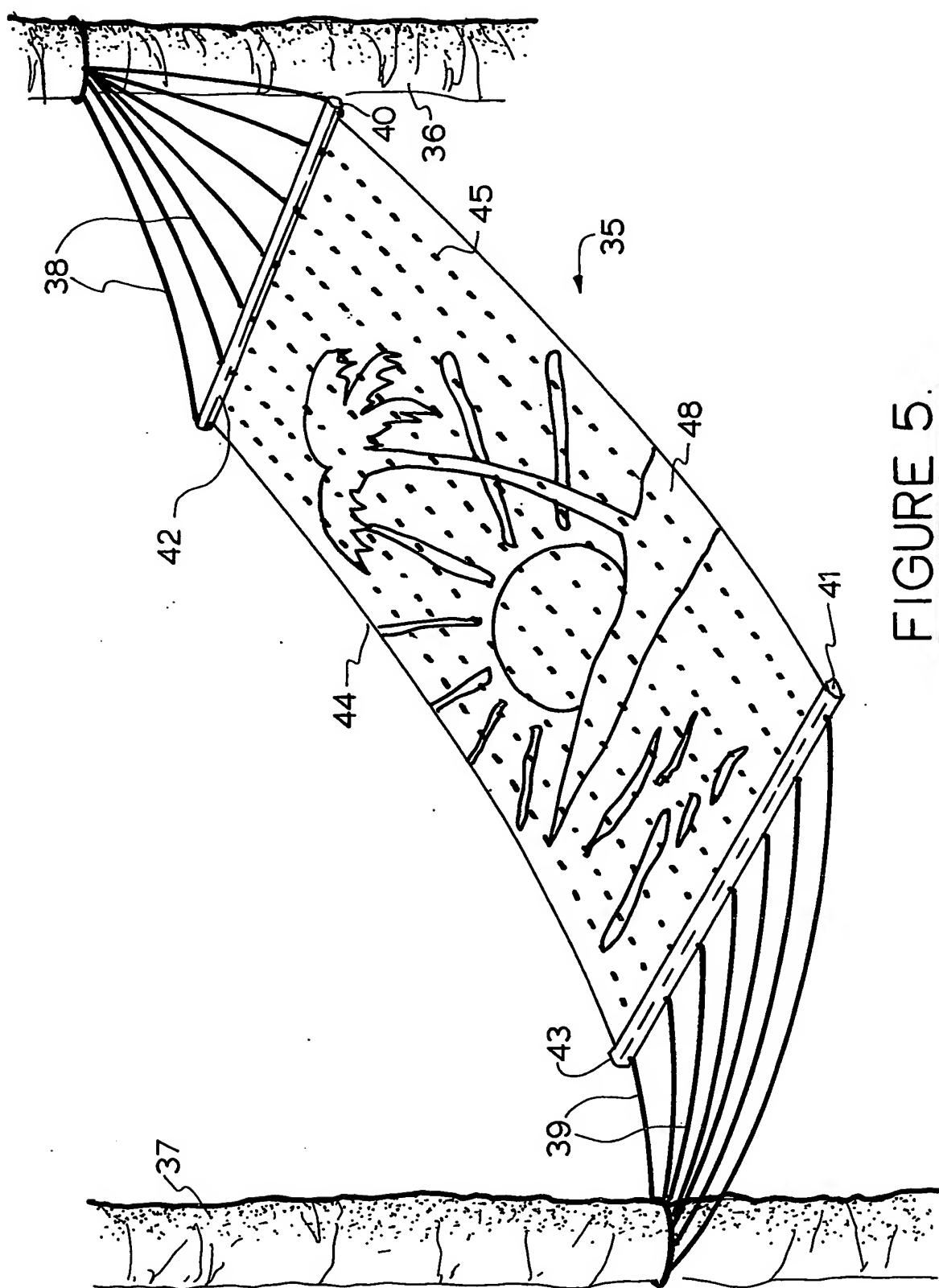


FIGURE 5.

10/554395

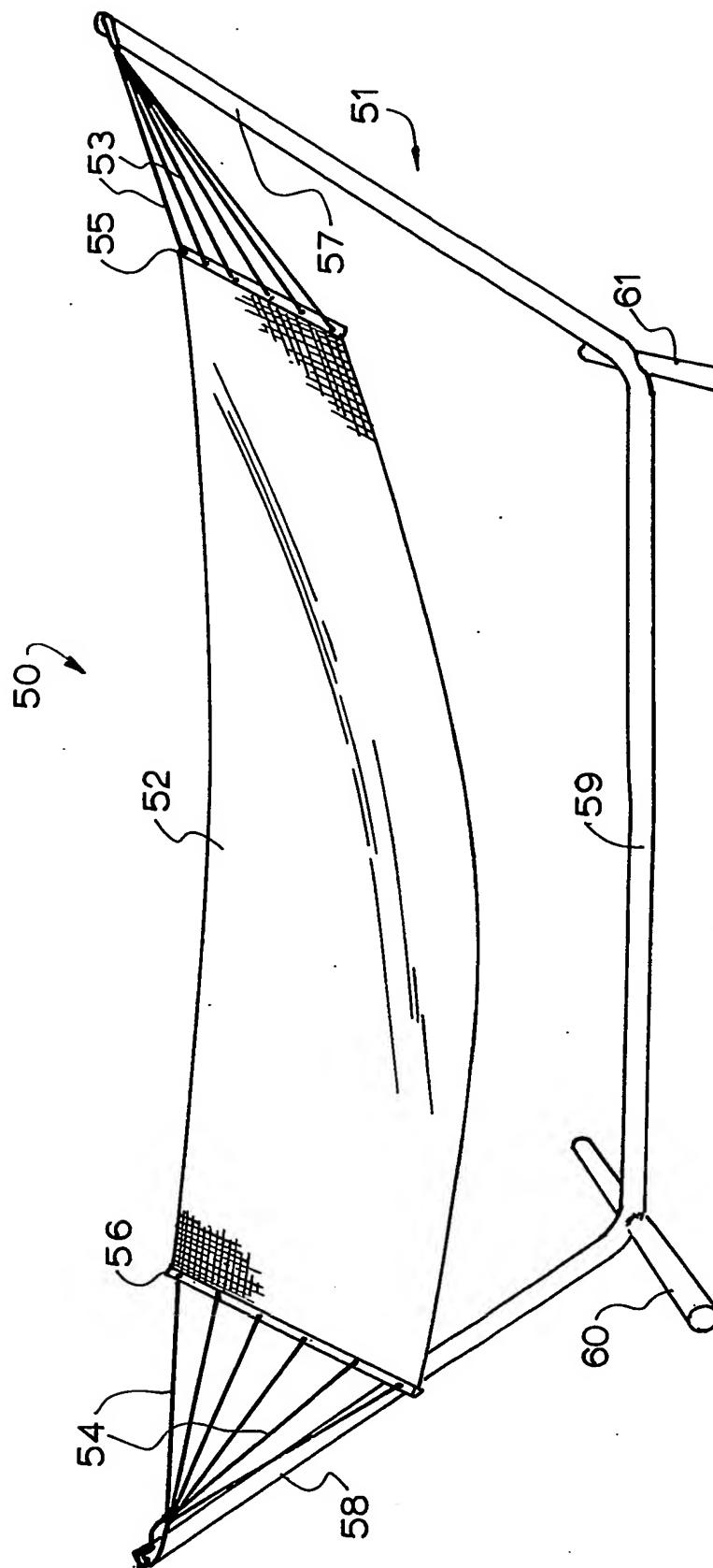
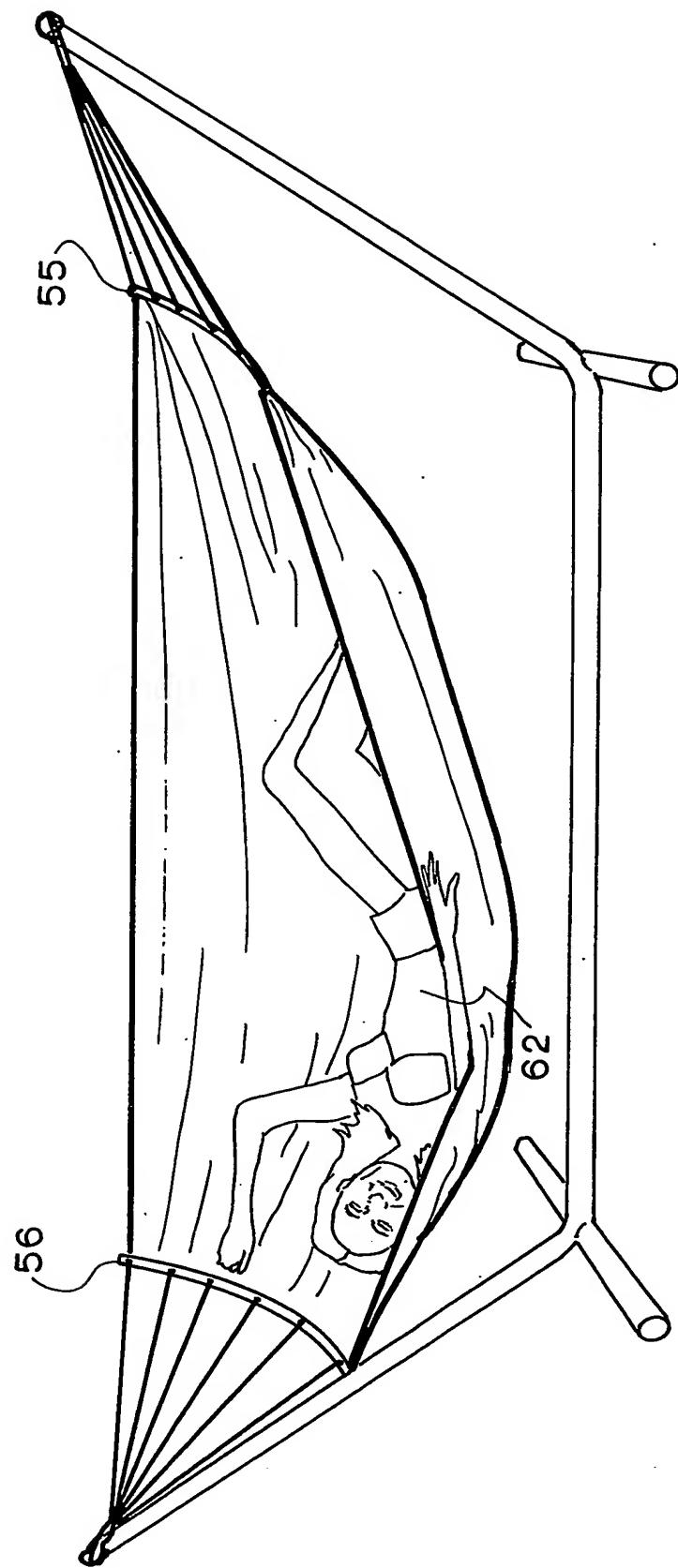


FIGURE 6.

101554395



## FIGURE 7.

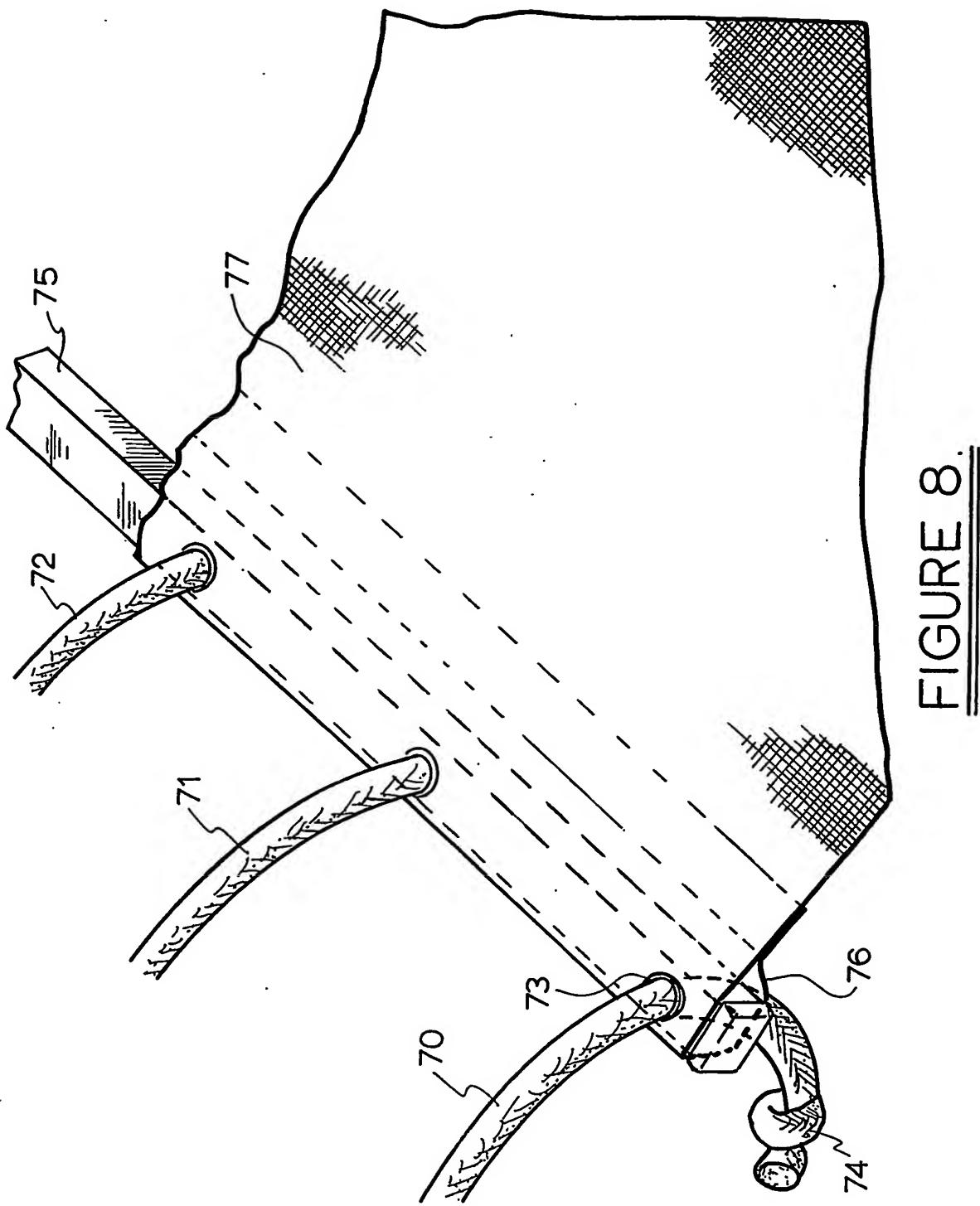


FIGURE 8.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU2004/000536

## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. 7: D04B 1/14, 1/16, 1/18 A45F 3/22, 3/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPC Class marks A45F, A47C, D03D, D04B + Key words (Fabric, Cloth, Material, Stretch, Flex, Deform, Woven, Weave, Knit, Hammock, Seat, Chair, Lounge, Polyester, Nylon, Polyprop+, Furniture)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X A	US 2004/0067707 A (HAMILTON et al), 8 April 2004 Whole Document	1-6 7-27, 38-40
X A	US 5596888 A (MCLARTY, III et al), 28 January 1997 Whole Document	1-6 7-27, 38-40
A	EP 501809 B (GENERAL MOTORS CORPORATION), 2 September 1992	1-27, 38-40
A	EP 123472 A ('W' RIBBONS LTD.), 31 October 1984	1-27, 38-40
A	Derwent Abstract Accession No. 2002-174470/23, Class A83 F02(A23), JP 2001303378 A (ASAHI KASEI KOGYO KK), 31 October 2001	1-27, 38-40
A	US 4469739 A (GRETZINGER et al), 4 September 1984	1-27, 38-40

Further documents are listed in the continuation of Box C  See patent family annex

* Special categories of cited documents:	
"A"	document defining the general state of the art which is not considered to be of particular relevance
"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means
"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search 16 July 2004	Date of mailing of the international search report 21 JUL 2004
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6283 3929	Authorized officer <b>G.B. NATH</b> Telephone No : (02) 6283 2126

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU2004/000536

### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See supplementary sheet.

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:1-27, 38-40

#### Remark on Protest

The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

International application No.  
**PCT/AU2004/000536**

**Supplemental Box**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: III**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-27 and 38-40. It is considered that a fabric for use in furniture formed in part at least from a synthetic material wherein the synthetic material is woven or knitted to provide a stretch characteristic of from 5% to 50%, comprises a "first special technical feature".
2. Claims 28-31. It is considered that a spreading rod for a hammock or hammock chair formed as a flexible elongate member adapted to deform under load and to assume its undeformed configuration when not loaded comprises a "second special technical feature".
3. Claims 32-37. It is considered that a method of forming a hammock as defined comprises a "third special technical feature".

Since the above-mentioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/AU2004/000536

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
US	2004067707	WO	2004033772				
US	5596888		NONE				
EP	0501809	AU	11143/92	BR	9200596	CA	2061688
		GB	2253217	JP	'5068757	MX	9200814
		US	5215807				
EP	0123472		NONE				
JP	2001303378		NONE				
US	4469739	BR	8304290	CA	1229027	EP	0101305
		ES	8600431	JP	59088946		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX